

Installation, Start-Up and Service Instructions

for Sizes 040-115 (100 Series)



→ **IMPORTANT:** Induced-combustion furnaces require special installation techniques. Follow these instructions carefully.

⚠ CAUTION

Do not connect this furnace to a chimney flue serving a separate appliance designed to burn solid fuel, per American National Standard Z21.476-1986 National Fuel Gas Code.

The design of the downflow/horizontal (Fig 1 and 2) gas-fired furnace is AGA certified for natural and propane gas installation on combustible flooring (with optional floor base), in alcoves, attics, crawl spaces, basements, closets or utility rooms. The design of this furnace line is *not* AGA certified for installation in mobile homes, recreation vehicles or outdoors.

GENERAL

Before starting installation of this furnace, read these instructions carefully and completely. After installation is complete, remove the Energy Guide tag from the furnace. Also read the Procedures for Induced-Combustion Gas-Fired Furnaces (packaged with furnace) for important information concerning combustion, venting, piping and other standard installation practices. Further reference can be made to the current edition of the American National Standard Z223.1 National Fuel Gas Code.

The induced-combustion vent system of this furnace is designed to operate at zero or negative pressure at the vent connector outlet. This furnace, therefore, complies with the National Fuel Gas Code (NFPA 54-1984 or ANSI Z223.1-1984), Part 7.14.3.b This furnace is also listed by AGA for use with the type-B1 gas vent, as described in the National Fuel Gas Code, Part 7.3.2.

Each furnace is shipped from the factory completely assembled with multispeed direct-drive blower, and wired ready for indoor heating installation. All sizes feature a blower control center with easy-to-read low-voltage terminal strip to ensure proper connections.

The output capacity and any representations of efficiency for this product are based on standard Department of Energy test procedures. The installed operation may vary, depending on installation, weather and other factors.

⚠ CAUTION

Do not block openings in front of furnace or on furnace top along side vent pipe. These openings provide air for combustion and ventilation. Never store anything on or in contact with furnace, such as aerosol cans, rags, brooms and mops, cleaning tools and aids, powders, bleaches, waxes, plastic items, gasoline, kerosene, lighter fluids, cleaning fluids, thinners, painting compounds or paper products.

⚠ CAUTION

Do not install furnace in a corrosive or contaminated atmosphere. Adhere to all combustion and circulating air requirements listed in Procedures for Induced-Combustion Gas-Fired Furnaces. Observe all local codes and ordinances.

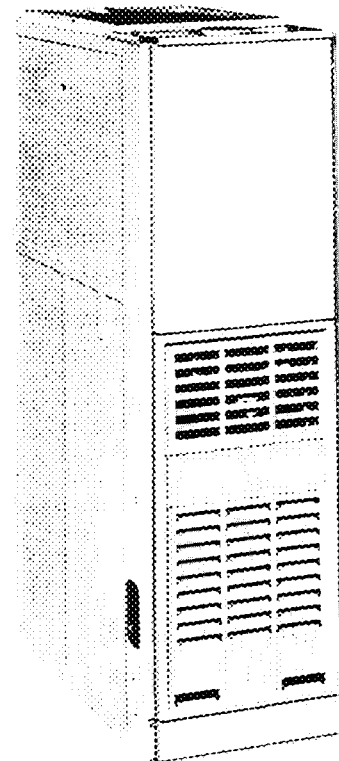


Fig. 1 — Furnace in Downflow Position

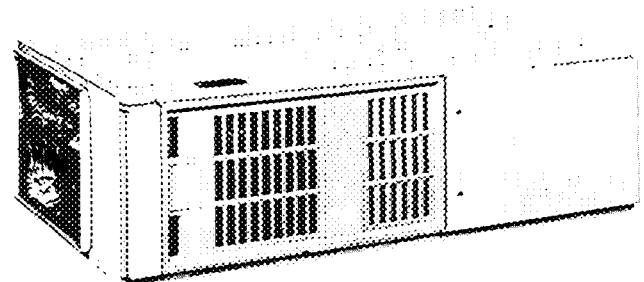


Fig. 2 — Furnace in Horizontal Position

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

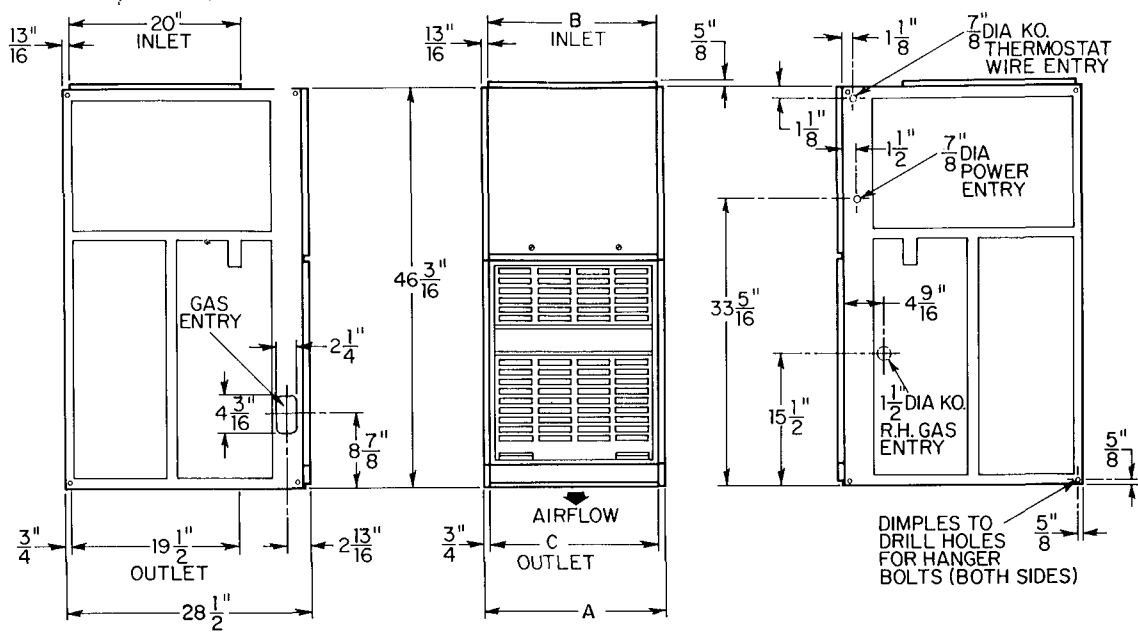


Fig. 3 — Dimensional Drawing (in.)

Installation Procedures

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*Refer to appropriate sections of Procedures for Induced-Combustion Gas-Fired Furnaces booklet packed with this furnace

INSTALLATION

Supply-Air Plenum (Downflow)

INSTALLATION ON CONCRETE SLAB

1. See Fig. 3 for dimensions and location of supply-air opening in furnace bottom.
2. Construct hole in floor. See Fig. 4 and Table 4.
3. Place plenum and furnace as shown in Fig. 5

INSTALLATION ON COMBUSTIBLE FLOOR

1. Read installation instructions packaged with accessory combustible floor base (Fig. 6).
2. Cut and frame hole in floor. See installation instructions packaged with combustible floor base. If this requires cutting a floor joist, tie ends of cut joist into adjacent joists for proper floor support.
3. Assemble and install combustible floor base per instructions packaged with base.
4. When completed, install combustible floor base, plenum, and furnace (or coil casing when used). See Fig. 7.

Horizontal Attic Installation — The Model 58DHB furnace can be installed horizontally on either the left-hand or right-hand side. A typical attic installation is shown in Fig. 8.

Table 1 — Clearances (in.)

SIZES	040 and 055	075-115
DOWNFLOW (In Alcove or Closet)		
Sides		
Single-Wall Vent	1	0
Type-B1 Double-Wall Vent	0	0
Back	0	0
Top	1	1
Front*		
Single-Wall Vent	6	6
Type-B1 Double-Wall Vent	3	3
Vent		
Single Wall	6	6
Type-B1 Double Wall	1	1
HORIZONTAL (In Alcove)		
Sides†	1	0
Back	0	0
Top		
Single-Wall Vent	1	1
Type-B1 Double-Wall Vent	0	0
Front*	18	18
Vent		
Single Wall	6	6
Type-B1 Double Wall	1	1
HORIZONTAL (In Closet)		
Sides†	1	1
Back	3	3
Top		
Single-Wall Vent	2	2
Type-B1 Double-Wall Vent	2	2
Front*		
Single-Wall Vent	6	6
Type-B1 Double-Wall Vent	3	3
Vent		
Single Wall	6	6
Type-B1 Double Wall	1	1

*Provides a 30-in. service clearance in front of the furnace.
†Indicates supply or return sides when furnace is in the horizontal position

Table 2 — Dimensions (in.)

MODEL 58DHB	A	B	C	VENT CONN
040-100BC	14 7/16	12 5/16	12 11/16	4
055-100BC	14 7/16	12 5/16	12 11/16	4
055-100CC	14 7/16	12 5/16	12 11/16	4
075-100BC	17 1/2	15 5/8	16	4
075-100CC	17 1/2	15 5/8	16	4
095-100CC	17 1/2	15 5/8	16	4
095-100DC	21	19 5/8	19 1/2	4
115-100CC	24 1/2	22 13/16	23	5

Table 3 — Ratings and Performance*

MODEL 58DHB	INPUT (Btuh)	CAPACITY (Btuh)†	TEMP RISE RANGE (F)	HEATING		COOLING		MOTOR HP (PSC)	APPROX SHIP WT (lb)
				Ext Static Pressure (in. wc)	Cfm	Ext Static Pressure (in. wc)	Cfm		
040-100BC	48,000	39,000	50-80	0 10	610	0.5	790	1/8	130
055-100BC	67,000	56,000	40-70	0 10	775	0.5	860	1/4	140
055-100CC	67,000	56,000	35-65	0 15	980	0.5	1150	1/8	142
075-100BC	90,000	75,000	45-75	0 12	1010	0.5	1225	1/8	160
075-100CC	90,000	75,000	40-70	0 15	1250	0.5	1530	1/2	163
095-100CC	114,000	95,000	55-85	0 20	1360	0.5	1590	1/2	178
095-100DC	114,000	95,000	55-85	0 20	1270	0.5	1900	1/2	188
115-100CC	137,000	114,000	45-75	0 20	1900	0.5	2010	1/2	208

PSC — Permanent Split Capacitor

*The above gas inputs are certified for altitudes to 2000 feet For elevations above 2000 ft, reduce input 4% for each 1000 ft above sea level

†Determined by U S Government tests

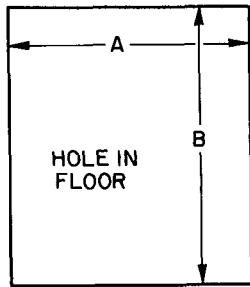


Fig. 4 — Floor Opening for Concrete Slab

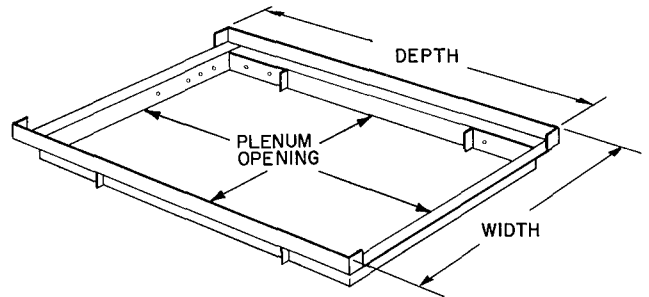


Fig. 6 — Accessory Combustible Floor Base

Table 4 — Opening Dimensions (in.)

FURNACE CASING WIDTH	A	B
		Heat-Only
14 ⁹ / ₁₆	13 ¹ / ₁₆	19 ⁹ / ₁₆
17 ¹ / ₂	16 ⁷ / ₁₆	19 ⁹ / ₁₆
21	19 ⁹ / ₁₆	19 ⁹ / ₁₆
24 ¹ / ₂	23 ⁷ / ₁₆	19 ⁹ / ₁₆

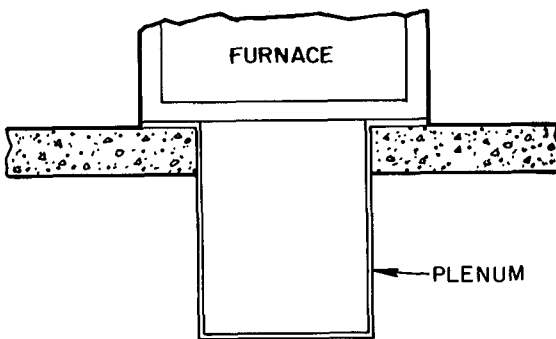


Fig. 5 — Furnace on a Concrete Slab

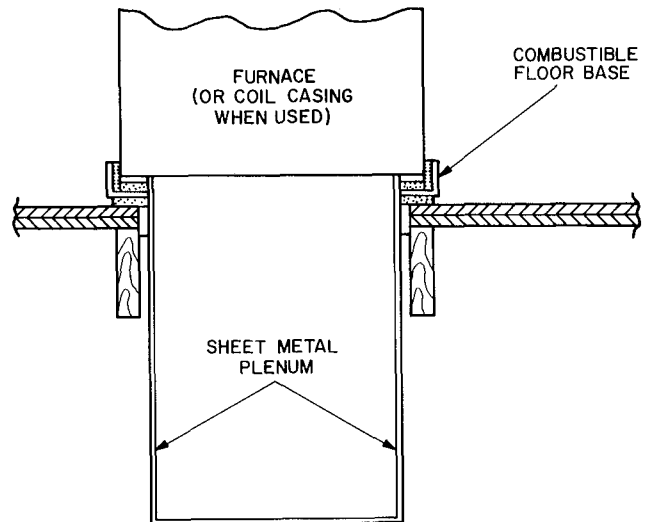


Fig. 7 — Furnace, Plenum, and Base Installed on Combustible Floor

NOTE: For attic or concealed installations, use type-B1 vent.

CONSTRUCT WORKING PLATFORM

1. Place working platform in location where all required furnace clearances are obtainable. See Table 1.
2. Use materials in platform that can support installer and service persons.
3. Secure platform to building joists.

INSTALL FURNACE

1. Position furnace in desired location.
2. Connect gas supply pipe. See Fig. 8 for typical piping entry. It is important to install a sediment trap in the gas pipe riser.
3. Connect supply and return air ducts.
 - a. Install duct flange kit (field supplied) as shown in Fig. 9.
 - b. Connect duct to furnace, using appropriate fasteners for type of supply air duct being used

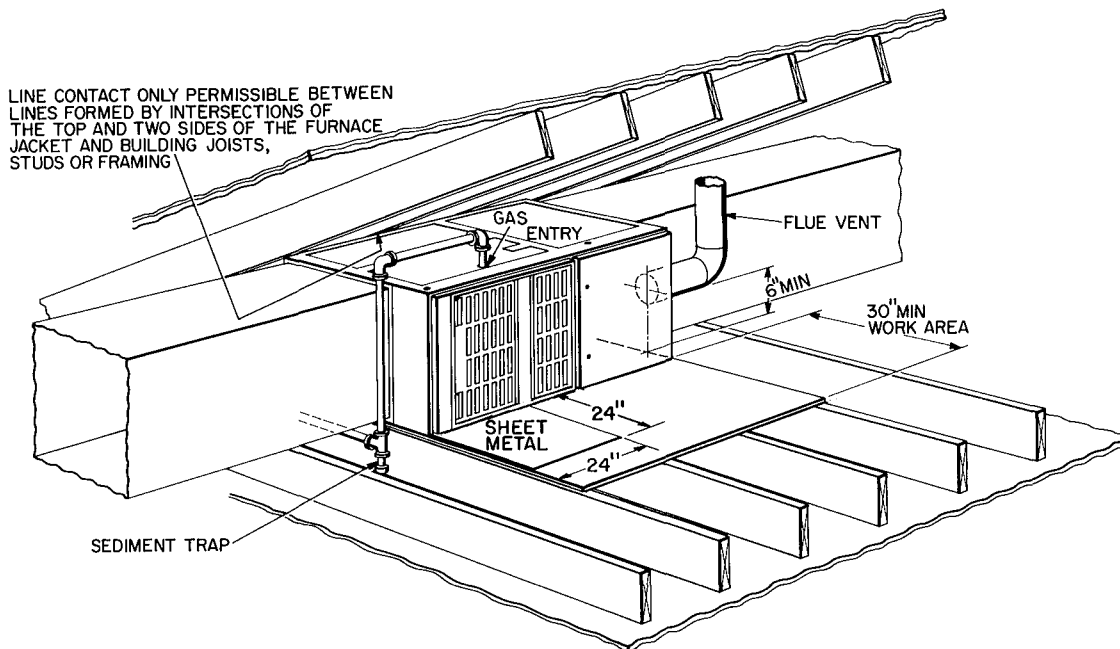


Fig. 8 — Typical Attic Installation

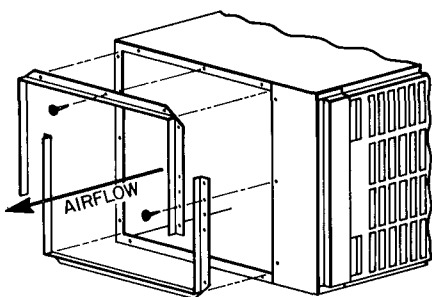


Fig. 9 — Duct Flange Installation (Field Supplied)

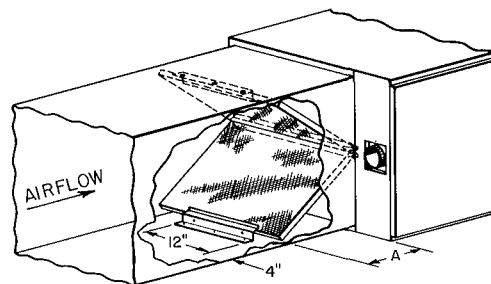


Fig. 10 — Horizontal Filter Arrangement (See Table 5. Brackets are field supplied.)

Table 5 — Filter Retainer (Field Supplied) (in.)

FURNACE CASING WIDTH	DIM. A (Fig. 10)
14 ⁹ / ₁₆	15 ¹ / ₁₆
17 ¹ / ₂	14 ¹ / ₂
21	13 ⁹ / ₁₆
24 ¹ / ₂	12 ³ / ₄

- c. Install filter retainer kit (field supplied) before connecting return air duct to furnace. See Fig. 10 and Table 5. See note below.

NOTE. For ease of servicing, a return air filter can be installed in a common return air grille. Air velocity rating must not exceed 300 fpm for disposable filters. Air velocity through reusable-type filters shall not exceed manufacturer's recommendations.

- d. Using appropriate fasteners for type of duct being used, connect return air duct to furnace.
4. Install 24- x 24-in sheet metal shield on platform in front of louvered control panel. See Fig. 8.

Crawl Space Installation — The Model 58DHB furnace can be installed horizontally with either the left-hand or right-hand side up. In crawl space, furnace can either be hung from floor joist or installed on suitable blocks or pad. Furnace can be suspended from each corner by hanger bolts (use four 3/8-in. all-thread rods cut to desired length, 1 x 3/8-in. flat washer, 3/8-in. lock washer, and 3/8-in. nut). Dimples are provided for hole locations. See Fig. 3.

NOTE: Use type-B1 vent in a concealed space.

Crawl space installation is very similar to attic installation. Refer to Horizontal Attic Installation, Install Furnace (steps 1, 2, 3). Installation of sheet metal shield in front of louvered control panel is covered in step 4. For crawl space installation, the same size sheet metal shield must be installed above louvered control panel. When installing furnace in horizontal position in a crawl space, extend sheet metal shield over furnace top sufficiently to cover gas pipe entry hole.

Filter Arrangement — Two factory-supplied filters are shipped in blower compartment. After return air duct has been connected to furnace, install filters in a

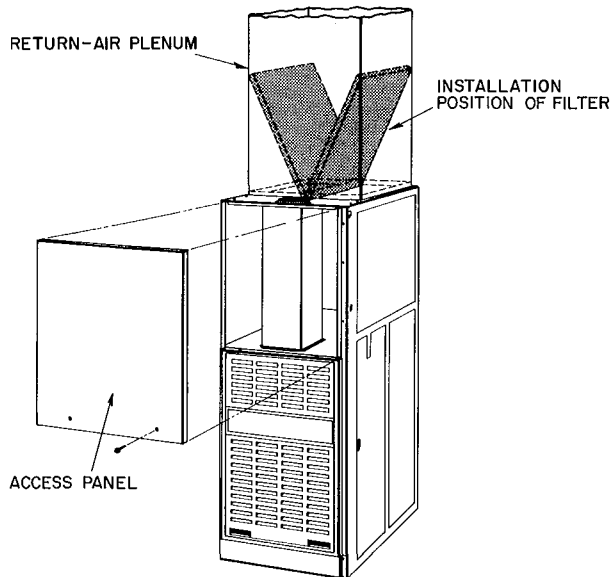


Fig. 11 — Downflow Filter Arrangement

V-formation inside return air plenum. See Fig. 10 and Table 5 for horizontal applications. See Fig. 11 for downflow applications.

⚠ WARNING
Never operate unit without a filter, or with filter access door removed.

Electrical Connections
LINE-VOLTAGE WIRING

IMPORTANT: Before proceeding with electrical connections, make certain that voltage, frequency, and phase correspond to that specified on unit rating plate. Also, check to be sure that service provided by utility is sufficient to handle additional load imposed by this equipment. Refer to unit rating plate for equipment electrical requirements.

⚠ CAUTION
Do not connect aluminum wire between disconnect switch and furnace. Make all electrical connections in accordance with National Electrical Code, ANSI/NFPA 70-1984, and any local codes or ordinances that apply.

See Fig. 12 for wiring diagram showing proper field high- and low-voltage wiring. Use separate fused branch electrical circuit containing proper fuse or HACR- (Heating, Air Conditioning and Refrigeration) type circuit breaker for this furnace. A disconnecting means must be located within sight from, and easily accessible from, the furnace. Blower door switch may be acceptable in some areas as a disconnect.

⚠ WARNING
Furnace must be electrically grounded in accordance with local codes and the National Electric Code, ANSI/NFPA 70-1984. Do not use gas piping as an electrical ground to avoid possibility of electric shock, personal injury or death.

If line voltage wiring to unit is encased in non-metallic sheath, connect incoming ground wire to grounding wire inside furnace junction box. If metallic conduit is used, it will serve as ground.

LOW-VOLTAGE WIRING — Make field low-voltage connections at low-voltage terminal strip. See Fig. 12.

NOTE: Use American Wire Gage (AWG) No. 18 color-coded copper thermostat wire for lengths up to 100 feet. Above 100 ft, use AWG No. 16 wire.

NOTE: When the furnace is installed in the horizontal position with right-hand discharge air, low-voltage wire connections can be made easier by removing the 2 control box mounting screws and letting the control box turn so that the low-voltage screw terminals are visible. Be sure to reinstall the control box after the connections are made.

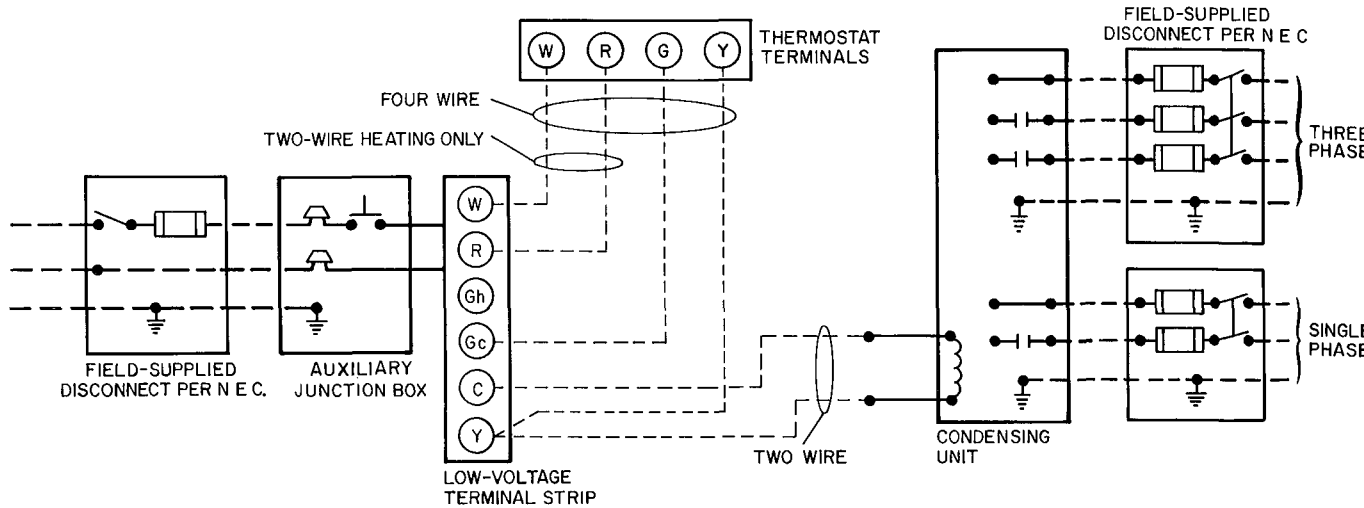


Fig. 12 — Heating and Cooling Application Wiring Diagram

IMPORTANT. The thermostat heat anticipator must be set to match amp draw of gas valve and electrical components in R-W circuit. Accurate amp draw readings can be obtained at thermostat subbase terminals R and W. Figure 14 illustrates an easy method of obtaining actual amp draw. Take amp reading after blower motor has started.

Room thermostat should be located where it will be in natural circulation path of room air. Avoid locations where thermostat would be exposed to cold-air infiltration, drafts from windows, doors, or other openings leading to outside, or exposed to air currents from warm- or cold-air registers; or to exposure where natural circulation of air is cut off — such as behind doors, above or below mantels, shelves, etc.

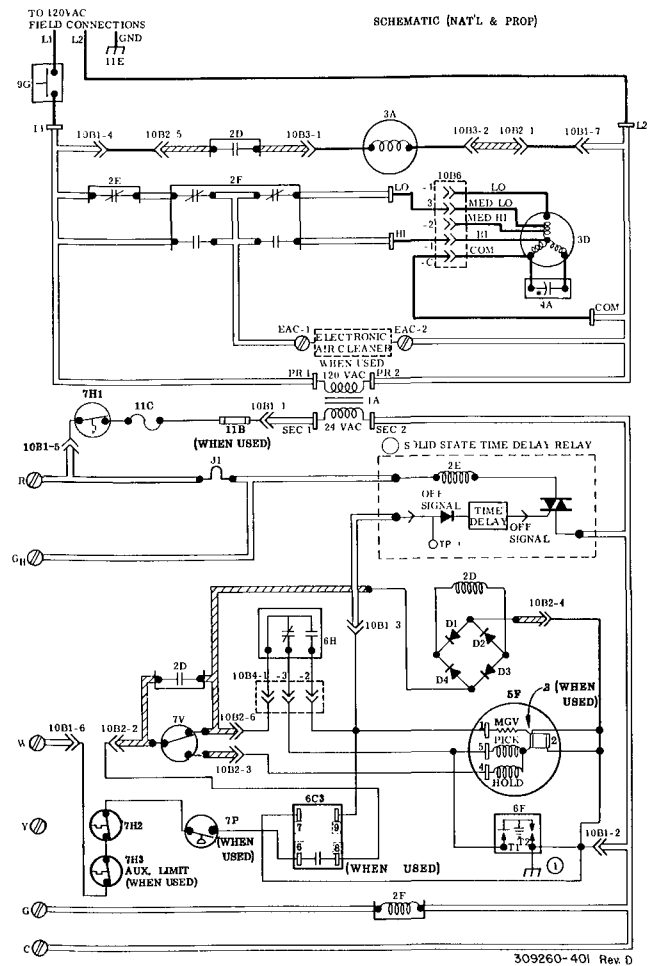
Thermostat should not be exposed to heat from nearby fireplaces, radios, televisions, lamps, or rays from sun. Do not mount thermostat on a wall containing pipes, warm-air ducts, or a flue or vent that could affect its operation. Any hole in the plaster or panel through which thermostat wires pass should be adequately sealed with suitable material to prevent drafts from affecting thermostat.

BLOWER CONTROL CENTER — Furnace features a blower control center. This aids installer and service technician when installing and servicing unit. A low-voltage terminal board is marked for easy connection of field wiring. See Fig. 15.

Sequence of Operation — Refer to wiring diagram, Fig. 13.

HEATING CYCLE

1. When blower door is in place, 115 volts is supplied through blower door interlock switch 9G. Transformer 1A is energized, supplying 24 volts to heating blower relay coil 2E, which opens normally closed blower relay contacts 2E in low-speed circuit of blower motor 3D.
2. Wall thermostat calls for heat, closing R and W circuit. This closed circuit supplies power to 24-volt safety circuit containing limit switch 7H1, fusible link 11C, manual reset draft safeguard switch 7H2, and manual reset auxiliary switch 7H3.
3. Simultaneously, PICK coil of gas valve 5F, spark generator 6F, and inducer-motor relay coil 2D are energized. Inducer-motor relay contacts 2D in the 115-volt circuit close, starting inducer blower motor 3A. Also, another set of contacts in inducer-motor relay 2D closes in 24-volt circuit, and locks in inducer-motor relay coil 2D. Coil is locked in until R and W circuit or safety circuit opens.
4. When PICK coil of gas valve 5F is energized, gas flows to pilot. Pilot gas is ignited by a spark produced by spark generator 6F. Simultaneously, inducer motor 3A comes up to speed, actuating flow sensing switch 7V, energizing HOLD coil of gas valve 5F. PICK coil of gas valve 5F and spark generator 6F are de-energized when contacts of pilot-flame sensing switch 6H move from normally closed position, breaking circuit to PICK coil and spark generator. In approximately 50 to 60 seconds normally open pilot-flame sensing contacts close, making circuit to MGV (Main Operator) of gas valve 5F. Gas valve 5F opens in approximately 10 seconds allowing gas flow to main burners, which are ignited by pilot 6H. Simultaneously, time-delay circuit 11L in blower control center is energized. Approximately 50 seconds after gas valve 5F opens, heating relay coil 2E is de-energized, which closes the 115-volt contacts of heating relay 2E, starting blower motor 3D on its heating speed.



309260-401 Rev. D

LEGEND

1A — Transformer 115-VAC/24-VAC	10B3 — Edge Connector (Inducer Control Board - 2 CKT)
2D — Inducer Motor Relay DPST-N O	10B4 — Pilot Connector
2E — Heating Blower Relay (HFR) DPST-N C	10B5 — Factory Test Points
2F — Cooling Blower Relay (CFR) DPDT	10B6 — Blower Motor Connector
3A — Inducer Motor	11C — Fusible Link (Overtemperature)
3D — Blower Motor	11E — Equipment Ground
4A — Run Capacitor	11L — Adjustable Resistor (Off Time)
5F — Gas Valve (Redundant) P C Board (Inducer Control)	TP1 — Test Point
6F — Spark Generator (Solid-State)	— Factory Wiring (115 VAC)
6H — Pilot-Flame Sensing Switch SPDT (733B)	— Factory Wiring (24 VAC)
7H1 — Limit Switch SPST-N C	— Field Wiring (115 VAC)
7H2 — Draft-Safeguard Switch (SPST-N C) Manual-Reset (When Used)	— Conductors on 6C1 (Furnace Control Board)
7H3 — Auxiliary Limit Switch (SPST-N C) Manual-Reset (When Used)	— Conductors on 6C2 (Inducer Control Board)
7V — Flow Sensing Switch SPDT	⊗ Screw Terminal for Field Wiring
9G — Blower Door Interlock Switch SPST-N O	□ 1/4-in Quick-Connect Terminals
10B1 — Edge Connector (Furnace Control Board)	
10B2 — Edge Connector (Inducer Control Board - 7 CKT)	

- NOTES:**
- 1 T2 internally connected to equipment ground spark generator (6F) mounting screws
 - 2 Relay (2E) contacts are normally closed until 120VAC is applied to furnace
 - 3 If any of the original wire as supplied must be replaced, it must be replaced with AWM (105 C) wire or its equivalent
 - 4 Blower motor (3D) has a thermal overload switch
 - 5 Blower motor (3D) factory speed selections are for average conditions. See installation instructions for details on optimum speed selection. Motor may have 3 or 4 speed taps
 - 6 Use copper wire only between the disconnect switch and the unit
 - 7 Symbols are an electrical representation only
 - 8 Pressure switch (7P) is used for propane only
 - 9 Fusible link usage. One required on upflow and 2 required on downflow/horizontal furnace.
 - 10 Lockout module (6C3) is used for propane or 100% shutoff natural gas
 - 11 Two-amp fuse in secondary or transformer for Canadian units only

→ **Fig. 13 — Line to Line Wiring Diagram**

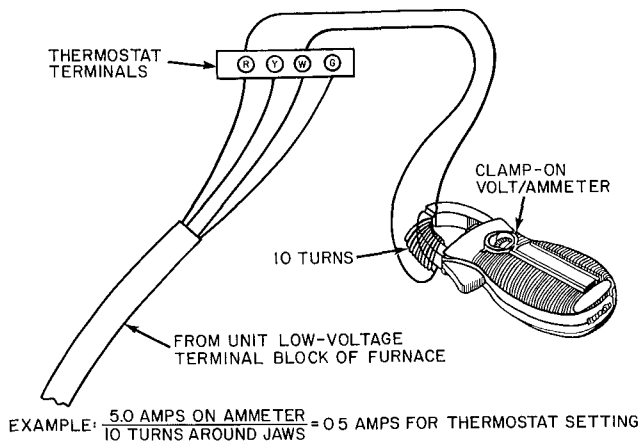


Fig. 14 — Amp Draw Check with Ammeter

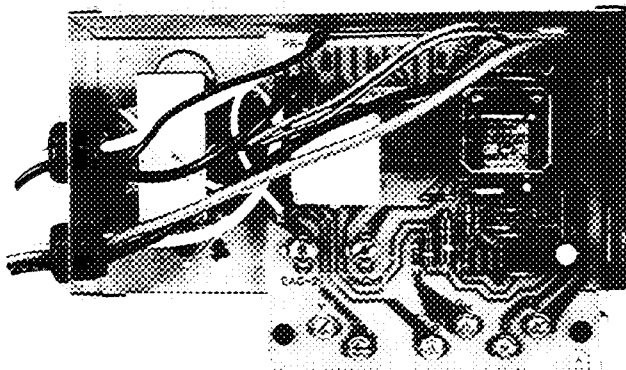


Fig. 15 — Blower Control Center

- When thermostat is satisfied, circuit between R and W is broken, de-energizing gas valve 5F, inducer motor relay 2D, and solid-state time-delay circuit on printed-circuit board. Gas flow stops immediately to pilot and main burners. After approximately 105 seconds, heat relay 2E is energized and blower motor 3D stops.

NOTE: After brief interruption of either electric or gas supply, furnace will not resume operation until contacts of pilot-flame sensing switch 6H move from normally open to normally closed position.

COOLING CYCLE

- Wall thermostat calls for cooling.
- The R, G, and Y circuits are energized. Simultaneously, R and Y circuit starts outdoor condensing unit, and R and G circuit energizes cooling relay coil 2F, which closes normally open contacts 2F, energizing cooling speed winding of motor 3D and opening normally closed contacts of cooling relay 2F.

START-UP AND ADJUSTMENT

In addition to the following information, refer to Procedures for Induced-Combustion Gas-Fired Furnaces packaged with the unit.

NOTE: Furnace blower door must be in place to complete 115-volt circuit to furnace.

⚠ CAUTION

Furnace is equipped with a fusible link in vestibule area. Link will melt if overheating condition caused by inadequate combustion air supply or improper venting practices develops. *Do not* jumper this fuse. Correct condition and replace fuse with identical part.

Gas service pressure must not exceed 14 in. wc (1/2 in. psig) for natural gas.

NOTE: Gas valve regulator has been factory set at 3.5 in. wc for natural gas. Refer to Procedures for Induced-Combustion Gas-Fired Furnaces for readjusting when checking input.

Adjustment of Blower Speed

⚠ WARNING

Disconnect electrical power before changing speed tap to avoid possibility of electric shock, personal injury or death.

To change motor speed taps, remove motor tap lead. See Table 6. Relocate it on desired terminal on plug-in terminal block/speed selector located on blower.

⚠ CAUTION

When adjusting blower speed, make certain that temperature rise across heat exchanger does not exceed that specified on rating plate.

Table 6 — Speed Selector

SPEED	TAP NO.	COLOR
COMMON	C	White
HI	1	Black
MED-HI	2	Yellow
MED-LOW	3	Blue
LOW	4	Red

NOTE: Black control box lead to cooling speed selection, red control box lead to heating speed selection

Automatic Gas Control Valve — Unit is equipped with an automatic gas control valve. If not already checked when lighting main burner, check proper operation of valve by moving room thermostat pointer above room temperature, and observing that main burners light on call for heat (there will be a time delay), and go off when pointer is moved below room temperature setting.

NOTE: For ease of adjusting pilot flame, disconnect and tape one power lead at main gas valve. Disconnect terminal no. 1. This prevents main burner ignition and allows time to adjust pilot. Reconnect power lead after adjustment

CARE AND MAINTENANCE

⚠ CAUTION

To prevent possible damage to equipment or personal injury, maintenance should be performed only by qualified persons.

⚠ WARNING

To avoid possibility of fire, explosion, personal injury or even death, never store anything near furnace, such as:

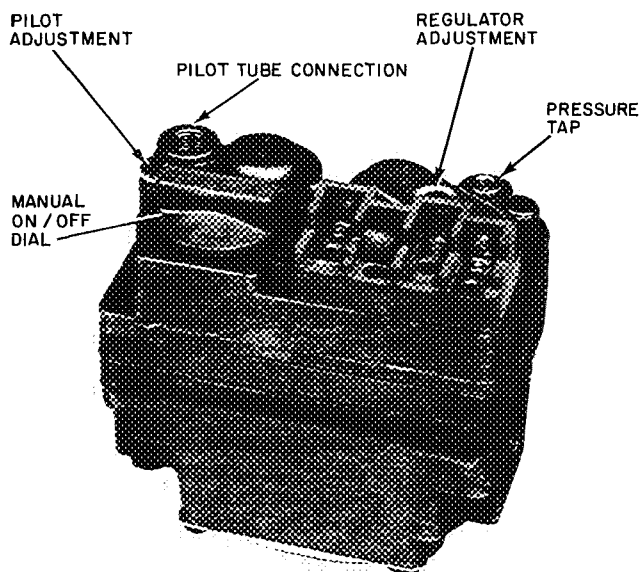
1. Aerosol cans, rags, brooms, dust mops, cleaning aids and tools.
2. Soap powders, bleaches, waxes or other cleaning compounds: plastics, gasoline, kerosene, lighter fluids, dry cleaning fluids or other combustible fluids.
3. Paint thinners, painting compounds, paper products.

For continuing high performance, and to minimize possible equipment failure, it is essential that periodic maintenance be performed on this equipment. Consult dealer as to proper frequency of maintenance and availability of a maintenance contract.

Ability to properly perform maintenance on this equipment requires certain mechanical skills and tools. If you do not possess them, contact dealer for maintenance.

⚠ WARNING

Turn off gas and electrical supplies to unit before performing any maintenance or service on unit. Follow relighting instructions on plate attached to furnace to avoid possibility of fire, explosion, personal injury or death.



→ Fig. 16 — Redundant Automatic Gas Essex 345 Control Valve

Minimum Maintenance Requirements

1. Check and clean or replace air filter each month or as required.

2. Check blower motor and wheel for cleanliness and lubrication each heating and cooling season. Clean and lubricate as necessary.
3. Check electrical connections for tightness and controls for proper operation each heating season. Service as necessary.

⚠ WARNING

As with any mechanical equipment, personal injury can result from sharp metal edges, etc. Be careful when removing parts.

Air Filter — Each furnace accommodates 2 filters which are installed in return-air duct. See Fig. 10 and 11. To clean or replace filters:

1. Disconnect electrical power before removing access panel.
2. Remove upper access panel.
3. Reach up behind top plate, tilt filters toward center of return-air plenum, remove filters. Replace or clean as needed.
4. Furnaces are equipped with permanent, washable filters. Clean filters as follows:
 - a. Clean with tap water
 - b. Rinse and let dry. No oiling or coating of filters is required.
 - c. Reinstall filters with cross-hatch binding facing blower.

NOTE: The following steps should be performed by a qualified service person.

Blower Motor Wheel

1. Remove blower access panel
2. Remove vent pipe enclosure.
3. Disconnect vent pipe and remove short piece of pipe from furnace
4. Disconnect wires from auxiliary limit on blower housing.

NOTE: For ease of blower removal, it may be necessary to remove control box on some sizes.
5. Remove blower assembly from furnace.
6. Remove motor from blower housing.
7. Lubricate motor using good grade of SAE 20 non-detergent motor oil. Put one teaspoon, 5cc, 3/16 oz, or 16 to 25 drops in each oil port.
8. Remove blower wheel from housing and clean by using vacuum with soft brush attachment. Be careful

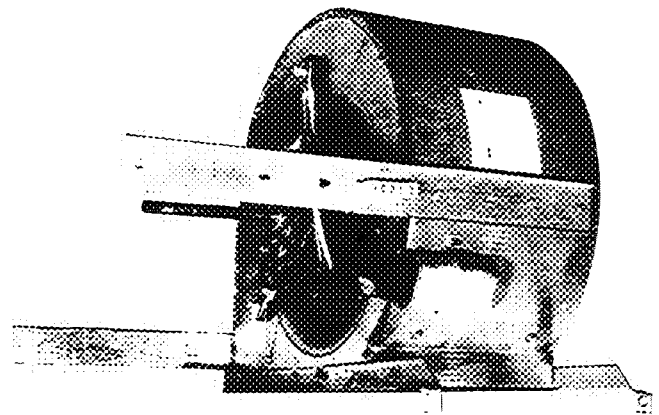


Fig. 17 — Dual Blower with Left-Hand Housing and Wheel Removed

not to disturb balance weights (clips) on blower wheel vanes.

▲ CAUTION

Be sure motor is properly positioned in blower housing. Motor oil ports must be at a minimum of 45° above horizontal centerline of motor after blower assembly has been reinstalled in furnace.

9. Reassemble furnace by reversing above procedures.

When more detailed servicing procedure is required, see furnace Service Manual available from dealer.

Cleaning Heat Exchanger

NOTE: Deposits of soot and carbon indicate that a problem exists. Action must be taken to correct the problem.

To clean heat exchanger of carbon deposits, soot, etc..

1. Turn off gas and power to furnace
2. Remove control and blower access doors.
3. Remove vent pipe enclosure and disconnect vent pipe from relief box.
4. Remove 4 screws that secure relief box to blower shelf.
5. Disconnect 2 wires from safeguard switch.
6. Disconnect wire harness edge connector from side of inducer control box.
7. Remove 8 screws that secure flue collector box to center panel. Use care not to damage sealant.
8. Remove complete inducer assembly from furnace, exposing flue openings.
9. Remove flue choke.
10. Clean cells using field-supplied small wire brush, steel spring cable, reversible electric drill and vacuum cleaner.
 - a. Assemble wire brush and steel spring cable
 - 1) Use 4 ft of 1/4-in. diameter high-grade steel spring cable (commonly known as drain cleanout or Roto-Rooter cable).
 - 2) Use 1/4-in. diameter wire brush (commonly known as 25-caliber rifle cleaning brush).

NOTE: Items called for in steps 1 and 2 may be purchased at local hardware store.

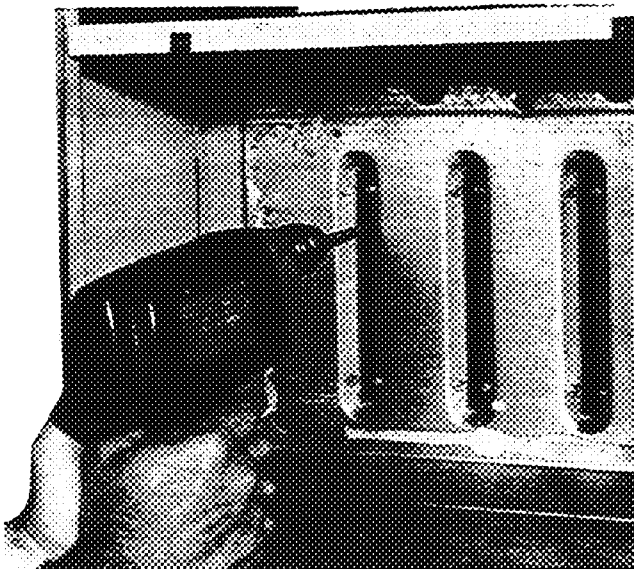


Fig. 18 — Cleaning Heat Exchanger Cell

- 3) Remove metal screw fitting from wire brush to allow insertion into cable.
- 4) Insert twisted wire end of brush into end of spring cable, and crimp tight with crimping tool or strike with ball-peen hammer. *Tightness is very important.*

- b. Clean each heat exchanger cell.

- 1) Attach variable-speed reversible drill to end of spring cable (end opposite brush).
 - 2) Insert brush end of cable into upper opening of cell and slowly rotate with drill. *Do not* force cable. Gradually insert at least 3 ft of cable into 2 upper passes of cell. See Fig. 18.
 - 3) Work cable in and out of cell 3 or 4 times to sufficiently clean. *Do not* pull cable with great force. Reverse drill and gradually work cable out.
 - 4) Remove burner assembly and flame radiators. Identify gas valve leads.
 - 5) Insert brush end of cable in lower opening of cell. Clean 2 lower passes of cell in same manner as 2 upper passes.
 - 6) Repeat above procedures until each cell in furnace has been cleaned.
 - 7) Using vacuum cleaner, remove residue from each cell.
 - 8) Using vacuum cleaner with soft brush attachment, clean burner assembly.
 - 9) Reinstall burner assembly and flame radiators. Take care to center flame radiators in the cell openings. Refer to furnace wiring diagram when reconnecting gas valve leads.
11. After cleaning flue openings, check sealant on flue collector to ensure it has not been damaged. If new sealant is needed, replace with proper material.
 12. Replace flue choke.
 13. Clean and replace flue collector assembly, making sure all 8 screws are secure.
 14. Replace 4 screws that secure relief box to blower shelf.
 15. Reconnect 2 wires to safeguard switch.
 16. Reconnect wire harness edge connector to side of inducer control box.
 17. Reconnect vent pipe to relief box. Reinstall pipe enclosure.
 18. Replace blower door only.
 19. Turn on power and gas.
 20. Set thermostat. Check furnace for proper operation.
 21. Check for gas leaks.
 22. Replace control door.

▲ WARNING

Never use a match or other open flame to check for gas leaks. Use a soap-and-water solution to avoid possibility of fire, explosion, personal injury or death.

Pilot — Check pilot and clean if necessary at beginning of each heating season. Pilot flame should be high enough for proper impingement of safety element and to light burners. Remove accumulation of soot and carbon from safety element or sensing probe and check electrode position. See Fig. 19.

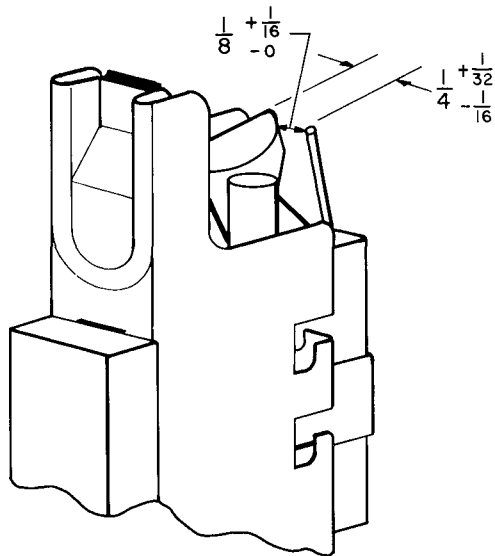


Fig. 19 — Position of Electrode to Pilot (in.)

Electrical Controls and Wiring

NOTE There may be more than one electrical supply to unit.

With power to unit disconnected, check all electrical connections for tightness. Tighten all screws on electrical connections. If any smoky or burned connections are noticed, disassemble connection, clean all parts and stripped wire, reassemble properly and securely. Electrical controls are difficult to check without proper instrumentation; therefore, reconnect electrical power to unit and observe unit through one complete operating cycle. If there are any discrepancies in operating cycle, contact dealer and request service.